Mexican data for January, 1896.

Stations.	Altitude.	Mean barometer.	Mean temperature.	Relative humidity.	Precipitation.	Prevailing direction. Wind.	Prevailing direction. Cloud.
	Feet.	*Inch.*	*° F.*	*%*	*Inch.*		
Aguascalientes	6,112.3						
Campeche	40.4						
Colima (Seminario)			71.4	69			sw.
Colima	1,291.7		73.8				
Culiacan	112.2	29.84	68.0	67	0.76		
Guadalajara (H. de B.)	5,141.2	25.32	57.6	82	0.08	w.	
Guadalajara (Obs. d. Est.)	5,186.4						
Guanajuato	6,761.3	23.69	57.6	48	0.01	wsw.	sw.
Jalapa	4,757.3	25.58	58.6		0.94	nnw.	
Lagos (Liceo Guerra)		24.16	56.8	48	0.06	sw.	sw.
Leon	5,901.0	24.31	57.0	43	0.11	ssw.	sw.
Mazatlan	24.6	29.98	70.0	78	1.75	nw.	sw.
Merida	50.2	30.03	70.7	70	0.01	ne.	n.
Mexico (Obs. Cent.)	7,488.7	23.08	55.0	54	0.02	nw.	sw.
Mexico (E. N. de S.)	7,480.5	23.12	55.4	61	0.02		
Morelia (Seminario)	6,401.0	23.98	55.6	62	0.43	ssw.	sw.
Oaxaca	5,164.4	25.10	64.6	54	0.00	w.	e.
Pabellon	6,312.4						
Pachuca	7,956.8	22.63	53.8	71	0.00	nne.	ne.
Progreso							
Puebla (Col. d'Est.)	7,118.2						
Puebla (Col. Cat.)	7,112.0	23.39	57.2	52	T.	nne.	sse.
Queretaro	6,069.7	24.20	57.2	50	0.20	e.	
Real del Monte (E. de H.)	9,095.2					sw.	
Saltillo (Col. S. Juan)	5,376.7	24.89	56.5	58	0.12	sw.	
San Luis Potosi	6,201.9						
Silao	6,063.1						
Tacambaro							
Tacubaya (Obs. Nac.)	7,620.2	22.98	54.3	56	T.	nw.	
Tampico (Hos. Mil.)							
Tehuacan	5,152.8						
Toluca	8,612.4	21.91	49.5	55	0.00	wsw.	sw.
Trejo (Hac. Silao, Gto.)							
Trinidad (near Leon)	6,010.1						
Veracruz	47.9						
Zacatecas	8,015.2	22.61	53.6	47	0.27	sw.	
Zapotlan (Seminario)	5,124.8	25.08	62.6		2.00	se.	sw.

COLD AIR IN LOW LANDS.

Mrs. L. H. Grenewald, the highly-esteemed voluntary observer at York, Pa., calls attention to the great discrepancy between the minimum temperatures occasionally observed at Harrisburg, Philadelphia, and York, of which the following are illustrations:

The morning minima of March 13, 1896, were as follows: Pittsburg, +8°; Philadelphia, +16°; Harrisburg, +8°; York, —6°; Washington, +14°.

The minimum at York was the lowest recorded since February 3, 1895. The temperature remained below freezing all day, but as the wind was nearly calm this extreme sensible temperature was less apparent. The maximum temperature on the same day at York was +29° and the mean temperature 12°. The sky was cloudless and the humidity about 70 per cent. A heavy snowstorm had occurred on the 11th and 12th and the ground was, therefore, covered with snow throughout the neighborhood.

The minima of the 14th were: Pittsburg, +14°; Philadelphia, +13°; Harrisburg, +6°; York, —6.2°; Washington, +14°.

On this day, in the morning, the sky was clear and the wind at 8 a. m. a light west at Philadelphia, but at York it was still calm with a clear sky. York is about 25 miles southeast of Harrisburg, 50 north of Baltimore, and 80 west of Philadelphia. York is less than 500 feet above sea level, and the hills of 1,000 feet or more in elevation that form the eastern border of the Appalachians are distant 25 miles to the north and northwest, 60 miles to the west and 40 miles to the southwest. During still nights a gentle flow of wind down the Susquehanna Valley prevails in the neighborhood of Harrisburg while a calm prevails in the neighborhood of York. The weather maps of the 13th and 14th show that after the storm of the 12th had passed rapidly northeastward along the middle Atlantic Coast there was a slight inflow of cold, dry air over Pennsylvania so that the isotherm of 20° passing northeastward through Harrisburg at 8. m. of the 12th moved a little farther south and east. On the morning of the 13th clear weather prevailed over Pennsylvania and neighboring States, with light northwest winds and rising pressure. On the 14th, 8 a. m., light winds from the northwest or southwest prevailed, the pressure had risen to 30.60 or 30.68 and the region between Lynchburg and Harrisburg was approximately the center of the area of high pressure.

It is a matter of common observation that within the areas of highest pressure there usually are not only clear sky, calms, or light winds and low temperatures, but many limited localities within which temperatures occur that are abnormally low. The locations of these cold spots depend upon combinations of several favorable circumstances, namely: (1) The atmosphere of this region is in a general state of descending motion, the descent is very slow and is due to the general coldness of the air, but specific portions of the atmosphere may be colder than others so that here and there may occur downpours of cold air from above. (2) When this air reaches the ground it still continues to cool if the ground is cold as is, of course, the case at nighttime, but if the ground is warm, as in the daytime, the air may become warmed and rise up by its buoyancy and make room for other colder air to come down; thus in the daytime the air near the ground is kept cool notwithstanding the sunshine while at nighttime it grows colder in proportion as the nights are longer and this is peculiarly true when the ground is covered with a layer of snow, as this cuts off all conduction of heat from below. During the nighttime the only important process at the surface of the ground is that of the radiation of heat. Heat is sent off in all directions through the air above us into the space beyond in a manner precisely similar to the radiation of light and just as light passes through clear air with only a slight absorption so also with heat. The air in contact with the soil may receive heat from it if the soil be warmer, but will give up heat to it if the soil be colder, provided it comes in contact with it. This process of conduction of heat from the air to the soil, to the foliage of plants and every other solid object goes on especially during clear cold nights, because on those occasions the heat received by solid objects can be radiated directly back into space. Such solids are, therefore, the mediums by which heat is taken from the air and then radiated through the air. The dust floating in the atmosphere and the globules of water forming clouds perform a similar office. If now in any quiet valley the air has only the gentlest perceptible motion, or if on an open plain the air rests stagnant all night, so that no great quantity of fresh heat is brought to the soil and foliage these latter will continue radiating and cooling as rapidly as the natures of the surfaces allow and will reach a minimum temperature that will depend largely upon the clearness of the sky, the amount of wind, their individual exposure to the sky, and the nature of their individual surfaces.

The cooling by radiation on a still, clear night can attain a very surprising amount. In India it has for ages been the custom to manufacture artificial ice by exposing water in pans, at nighttime, when the ordinary temperature of the air is far above freezing. Anyone may experimentally convince himself of the low temperatures produced by radiation if he will lay a thermometer on the top of several thicknesses of cotton wool or down or fur and set this arrangement under the open sky on a clear, still night. It is best to lay this preparation in a pan or shallow box so that a layer of cool air may rest quiet just above the thermometer. Under these conditions the morning minimum will be much lower than if the minimum thermometer had merely been fastened up against the inside of an ordinary shelter. Such a thermometer is one form of "radiation thermometer," and the temperature thus obtained is not the general temperature of the air, and it may not even be the general temperature of the air within the shallow box or the temperature of the upper surface of the cotton wool. It is simply the temperature of the thermometer bulb itself, and is the difference between its radiation outward and the radiation inward. By covering the bulb with different substances we get effects depending upon the radiating powers of those substances.

As radiant heat is always flowing towards every exposed object, and is also flowing from that object out in all directions, we must be on our guard against its effects whenever a thermometer is to be used. A thermometer hung up in the middle of an ordinary room in which the air is perfectly still does not give the temperature of the air, but an average of the temperatures of the interior surfaces of the walls of the room, and this is wholly the influence of radiation. If we wish the thermometer to give us the temperature of the air itself, we must set the air of the room into rapid motion past the thermometer, so that it shall come into contact with the latter. When this is done the thermometer will assume a temperature that is an average between the temperature of the walls and the air. If now we wish to completely cut off the influence of the walls, we must put a small shelter around the thermometer, such as a tube through which the air of the room may be drawn; a double thin-walled tube is necessary, and a rapid ventilation, if we would annul the effects of obnoxious radiations.

In meteorological observations there are a number of objects to be attained, each of which requires a special instrument. There is the radiation thermometer, which gives us the lowest temperatures of the surface of the ground, or of the foliage at nighttime; the black and bright bulbs in vacuo, for getting the intensity of sunshine; the wet bulb, which gives the temperature of evaporation of the surface of water, and, finally, there are the air thermometers, which are intended to give us the temperature of the air at any given spot. The physician needs to know the temperature of the air in which we live, the agriculturist needs the temperature of the soil and the temperature of the leaves of the plants, but the meteorologist wishes the temperature of great masses of air in the free atmosphere. In order to attain this latter temperature the Weather Bureau thermometers are placed high up, above tall buildings, where the wind will strike them freely, and in a light, open, wooden shelter, so that neither sunshine by day nor radiation by night can affect them. Under these circumstances it is found that the air at a hundred feet above the earth's surface does not go through the same changes in temperature that are experienced near the surface; it is neither so warm in the daytime nor so cold at nighttime; the midday maximum temperature is below that near the surface, while the morning minimum is oftentimes far higher than at the earth's surface.

The low temperatures observed on March 13 and 14 at York, Pa., while much higher temperatures prevailed at Harrisburg, Baltimore and Philadelphia, undoubtedly resulted from a favorable combination of the following circumstances, namely: snow on the ground, clear sky, light winds and calms, all favoring intense local surface radiation at York, but less so in Washington, Philadelphia, and surrounding cities; a central area of high barometer favoring the local descent of cold air; the location of the thermometers near the ground in still air at York, but high above the ground in the free wind at Philadelphia, Harrisburg, and other stations.

Under similar conditions great discrepancies in the minimum temperatures at stations only a few miles apart have often occurred in other parts of the country, and local controversies have often arisen as to the errors of thermometers and the carefulness of the observers. A notable case of this kind occurred in 1882, when differences of 20° were recorded at stations a few miles apart in the Mississippi Valley. The explanation of these discrepancies was very simple as soon as it was ascertained that they occurred during a perfectly clear calm night, and that the warmer stations were on ground a hundred feet above the surrounding lowlands, which were covered with snow. In such cases no conclusions derogatory to the observers or their instruments can be drawn from the discrepancies that appear under such circumstances.

THUNDERSTORMS AND CLOUDS IN JAMAICA.

Mr. Maxwell Hall, Proprietor of the Observatory at Kempshot, in the Island of Jamaica, and well known as meteorological reporter to that colony, suggests that the following classification of clouds, which he finds very appropriate to his island, may be of wider interest. Adhering to the primary terms of Howard, namely, cirrus, cumulus, and stratus, he states that in Jamaica the average drift of these clouds is, respectively, from the east-northeast, the southeast, and the east. The combinations of clouds and descriptions given by him are as follows:

Cloud.	Description.
1. Cirrus	Fibrous threads; mares' tails.
2. Cirro-stratus	Thin sheets of fibrous texture.
3. Cirro-cumulus	Flakes; mackerel-back.
4. Strato-cirrus	Thick sheets of wooly texture.
5. Cumulus	Rounded solid masses.
6. Cumulo-nimbus	Cumulus discharging rain.
7. Alto-cumulus	Fleeces of wool; flock of sheep.
8. Alto-stratus	Watery veil.
9. Strato-cumulus	Long, rolling waves, parallel to the horizon.
10. Nimbus	Stratus discharging rain.
11. Stratus	Low horizontal sheets of smoke-like cloud.
12. Fracto-stratus	Fragments of stratus.

Mr. Hall states that a cumulus cloud in the summer months in Jamaica is often a gigantic mass, 10 miles in diameter and 6 miles high. As to the importance of separating the cirri that move from the east-northeast from the cumuli that move from the southeast, he says:

> With a slightly falling barometer and a cirro-stratus from the east-northeast, an observer would be justified in supposing that a cyclone was approaching Jamaica on the usual path from the Windward Islands, if it were not for the fact that cirro-stratus *generally* comes from the east-northeast at that time of the year. * * * As a rule, cirrus in its various forms is seen in Jamaica daily during the summer and autumn months, especially between 6 and 7 a. m., but is rarely seen during the rest of the year. * * * The cirro-stratus cloud consists of thin sheets of fibrous texture; the threads often interlace so that the cloud appears to be woven. Solar halos, mock suns, etc., are caused by the ice particles of which this cloud is composed. Cirro-stratus is always found to surround the advancing half of a cyclone, and hence its importance in forecasting the weather. * * * Fracto-stratus is the commonest cloud in Jamaica, winter and summer; its easterly drift is due to the trade wind; it extends upward to about one mile from the surface of the sea, but the lower 1,000 feet is greatly affected by land and sea breezes.

With reference to thunderstorms, Mr. Hall quotes the average number of days with thunder, as observed by the late Professor Houzeau, who lived at one time about 6 miles northeast of Kingston. The maximum average per month is 10 days in August, but Mr. Hall, from 20 years' experience. advises that these numbers must be accepted with caution, inasmuch as in thunderstorm months three or four separate storms may often be seen at the same time from a high station, like the Kempshot Observatory, so that the real number of thunderstorms for Jamaica is much larger than is indicated by Houzeau's table. As a rule, the heavier the rain the greater the thunderstorm; lightning easily strikes the earth through wet trees, and it is only in September that danger from lightning is to be apprehended. Hail does not often fall in Jamaica; tornadoes are almost unknown, and waterspouts are seldom seen at sea. It is believed that hail is often heard falling at a great height in the air, but reaches the ground as cold rain; at Kempshot, 1,773 feet above sea level, the temperature of the rain is about 65° F., which is below the usual daily morning minimum, and the anomaly of having a minimum reading occur at the hottest time of the